Claims

1. Highly pure hexagonal boron nitride single crystals with far ultraviolet light emission characteristics emitting far ultraviolet light having the maximum light emission peak in the far ultraviolet region at a wavelength of 235 nm or shorter.

2. The highly pure hexagonal boron nitride single crystals with the far ultraviolet light emission characteristics in claim 1, wherein said far ultraviolet light is far ultraviolet light having the maximum light emission peak at a wavelength of 210 nm to 220 nm, remarkably at 215 nm.

3. A method for producing highly pure hexagonal boron nitride single crystals with far ultraviolet light emission characteristics, characterized in that the highly pure hexagonal boron nitride single crystals with far ultraviolet light emission characteristics emitting far ultraviolet light having the maximum light emission peak in the far ultraviolet region at a wavelength of 235 nm or shorter are produced through the procedures of mixing boron nitride crystals with a highly pure solvent, melting the same by heating under high-temperature and high-pressure, and recrystallizing the same.

4. The method for producing highly pure hexagonal boron nitride single crystals with the far ultraviolet light emission characteristics in claim 3, wherein said far ultraviolet light has the maximum light emission peak at a wavelength of 210 nm to 220 nm, remarkably at 215 nm.

5. The method for producing highly pure hexagonal boron nitride single crystals with the far ultraviolet light emission characteristics in claim 3 or 4, wherein said solvent is selected from nitride or boronitride of alkali metal or alkali earth metal.

6. A solid-state far ultraviolet light emitting element consisting of a highly pure hexagonal boron nitride single crystal, excited by electron beam irradiation to emit far ultraviolet light having the maximum light emission peak in the far ultraviolet region at a wavelength of 235 nm or shorter.

7. The solid-state far ultraviolet light emitting element in claim 6, wherein said far ultraviolet light is single-peaked high-luminance light with the peak at a wavelength of 210 nm to 220 nm, remarkably at 215 nm.

8. A solid-state far ultraviolet laser characterized by the generation of laser light with a far ultraviolet region wavelength, using a highly pure hexagonal boron nitride

crystal with far ultraviolet light emission characteristics as a direct-type semiconductor solid-state light emitting element and combining therewith an electron beam irradiation apparatus as an exciting source.

9. The solid-state far ultraviolet laser in claim 8, wherein said light in the far ultraviolet region generated thereby is the single-peaked high-luminance laser light with a peak at a wavelength of 210 nm to 220 nm, remarkably at 215 nm.

10. A solid-state far ultraviolet light emitting apparatus, characterized in that a light emitting layer consisting of a highly pure hexagonal boron nitride single crystal capable of emitting far ultraviolet light with a single emission peak in far ultraviolet region at a wavelength of 235 nm or shorter and an exciting means for exciting said light emitting layer are combined and encapsulated together into a vacuum container, and the light emitting layer is excited to emit far ultraviolet light by operation of the exciting means.

11. The solid-state far ultraviolet light emitting apparatus in claim 10, wherein said far ultraviolet light has a single peak at a wavelength of 210 nm to 220 nm, remarkably at 215 nm.

12. The solid-state far ultraviolet light emitting apparatus in claim 10, wherein said exciting means for exciting the light emitting layer is an electron beam emitting means.

13. The solid-state far ultraviolet light emitting apparatus in claim 12, characterized in that said exciting means by electron beam emitting means consists of an anode electrode attached to the back face of a light emitting layer consisting of a hexagonal boron nitride crystal, an electron beam emitting substrate attached to the light emitting layer through an insulating spacer, a cathode electrode attached to the back surface of the electron beam emitting substrate, and a means to apply voltage between both electrodes; and the electron beam is emitted from said electron beam emitting substrate toward the light emitting layer by application of voltage between both electrodes.

14. The solid-state far ultraviolet light emitting apparatus in claim 13, wherein said electron beam emitting substrate attached through said insulating spacer is a diamond substrate.

15. The solid-state far ultraviolet light emitting apparatus in claim 14, characterized by the structure of said diamond substrate wherein a large number of pyramid-shaped protrusions for emitting the electron beam are

arranged in a lattice-like manner on the surface facing the light emitting layer.